

WHAT IS CLAIMED IS:

1. A mobile communication terminal comprising:  
identification information receiving means for  
receiving identification information from at least one  
5 mini-communicator which transmits predetermined  
identification information of its own;

cellular communication means for implementing  
communication with a server or another terminal via a cellular  
communication network; and

10 switching control means for receiving a switching  
signal for switching among a plurality of modes comprising  
an identification information receive mode of activating  
only the identification information receiving means out of  
the identification information receiving means and the  
15 cellular communication means, and a cellular communication  
mode of activating only the cellular communication means,  
and for performing a mode switching control based on the  
received switching signal.

2. The mobile communication terminal according to  
20 Claim 1, further comprising:

measuring means for measuring a reception intensity  
of a radio wave received from the mini-communicator; and

information generating means for generating  
transmission information to the server, which contains the  
25 identification information of the mini-communicator  
received from the mini-communicator, identification

information of the mobile communication terminal, and the reception intensity of the radio wave from the mini-communicator, and formaking the cellular communication means transmit the generated transmission information to the server.

3. The mobile communication terminal according to Claim 2, further comprising:

traffic acquiring means for acquiring traffic information in the cellular communication network; and

information storing means for receiving and temporarily storing the transmission information from the information generating means, and for performing such an operation control as to output the transmission information to the cellular communication means or store the transmission information, based on the traffic information in the cellular communication network acquired by the traffic acquiring means.

4. The mobile communication terminal according to Claim 2, further comprising:

a memory for receiving and temporarily storing the transmission information from the information generating means; and

selecting-outputting means for selecting transmission information to be outputted, from the transmission information stored in the memory, based on condition information containing at least a thinning condition for

transmission information or a selection condition for transmission information to be outputted or to avoid output, and for outputting the transmission information to be outputted, to the cellular communication means.

5           5. The mobile communication terminal according to Claim 2, wherein the information generating means comprises:

          identification number memorizing means for memorizing an identification number of a mini-communicator which the mobile communication terminal was able to receive at a past  
10 point of time;

          determining means for comparing identification information of a mini-communicator which the mobile communication terminal is able to receive at the present time, with the identification number of the mini-communicator  
15 memorized, thereby determining whether there is a difference; and

          transmission control means for making the cellular communication means transmit the transmission information to the server, in a predetermined case where it is determined  
20 at least once that there is a difference.

          6. The mobile communication terminal according to Claim 1, further comprising:

          measuring means for measuring a reception intensity of a radio wave received from the mini-communicator;

25           receiving means for receiving from another mobile communication terminal, other terminal information

containing the identification information of the mini-communicator, the reception intensity of the radio wave from the mini-communicator, and location information of the other mobile communication terminal; and

5           location estimation control means for estimating the location of the mini-communicator corresponding to the transmission information, based on the reception intensity of the radio wave from the mini-communicator, measured by the measuring means of the mobile communication terminal, and on the other terminal information, and for notifying  
10           the server of the estimated location information.

7. The mobile communication terminal according to Claim 1, further comprising relaying means for amplifying a transmitted or received radio wave of the cellular  
15           communication network communicable with the mobile communication terminal, to relay the radio wave.

8. The mobile communication terminal according to Claim 1, wherein the cellular communication means is configured to:

20           set a transmission/reception channel for transmission/reception of the transmission information, separately from a user channel for transmission/reception of user data and a control channel for transmission/reception of a control signal, in communication via the cellular  
25           communication network, and transmit the transmission information through the use of the transmission/reception

channel.

9. A server capable of communication with at least one mobile communication terminal having identification information receiving means for receiving identification information from at least one mini-communicator, and cellular communication means for implementing communication with a server or another terminal via a cellular communication network, the server comprising:

switching signal transmitting means for transmitting to the mobile communication terminal a switching signal according to a predetermined mode switching request, in order to implement switching among a plurality of modes comprising an identification information receive mode of activating only the identification information receiving means out of the identification information receiving means and the cellular communication means, and a cellular communication mode of activating only the cellular communication means, at the mobile communication terminal.

10. The server according to Claim 9, further comprising:

a mini-communicator location database storing location information of at least one mini-communicator;

a terminal location database storing location information of at least one mobile communication terminal;

and

location estimating means for estimating a location

of a mini-communicator corresponding to transmission information, based on transmission information from said mobile communication terminal containing identification information of a mini-communicator which a mobile communication terminal received from said mini-communicator, identification information of said mobile communication terminal, and a reception intensity of a radio wave from said mini-communicator, the pre-stored location information of the mini-communicator, and the pre-stored location information of the mobile communication terminal, and for updating the mini-communicator location database by the estimated location information.

11. The server according to Claim 9, further comprising:

a mini-communicator location database storing location information of at least one mini-communicator; and location management means for receiving location information of a mini-communicator estimated and notified of by a mobile communication terminal, and for updating the mini-communicator location database by the received location information.

12. A communication system comprising at least one mini-communicator configured to transmit predetermined identification information of its own; a server capable of being connected to a cellular communication network; and at least one mobile communication terminal functioning as

an aggregation point for aggregating information from the mini-communicator;

wherein the mobile communication terminal comprises:

5 identification information receiving means for receiving the identification information from the mini-communicator;

cellular communication means for implementing communication with the server or another terminal via the cellular communication network; and

10 switching control means for receiving a switching signal for switching among a plurality of modes comprising an identification information receive mode of activating only the identification information receiving means out of the identification information receiving means and the  
15 cellular communication means, and a cellular communication mode of activating only the cellular communication means, and for performing a mode switching control based on the received switching signal;

wherein the server comprises:

20 switching signal transmitting means for transmitting a switching signal according to a predetermined mode switching request to the mobile communication terminal; and

wherein the switching control means of the mobile communication terminal performs the mode switching control  
25 based on the switching signal received from the server.

13. The communication system according to Claim 12,

said communication system further comprising a cellular network management apparatus having:

network state monitoring means for monitoring a state of the cellular communication network;

5 class information memorizing means for memorizing class information defined for each mobile communication terminal or for each user of the mobile communication terminal;

10 accepting means for accepting a user request about the mode switching control; and

switching signal generating means for generating a mode switching signal based on at least one of the class information acquired from the class information memorizing means, the state information of the cellular communication network acquired in monitoring by the network state monitoring means, and the user request accepted by the accepting means, and for transmitting the switching signal to the mobile communication terminal;

20 wherein the switching control means of the mobile communication terminal performs the mode switching control based on the switching signal received from the cellular network management apparatus.

14. The communication system according to Claim 12, wherein the server further comprises:

25 reference time generating-outputting means for generating a reference time as a reference of time stamp



and transmitting the reference time to the mobile communication terminal, and

wherein the mobile communication terminal further comprises:

5           time measuring means for measuring time; and

          calculating means for calculating a difference between the reference time transmitted from the server, and a measured time, and for outputting the value of calculated difference as a time stamp.

10           15. The communication system according to Claim 12, wherein at least one of the mobile communication terminal and the server further comprises authentication means for authenticating whether a mini-communicator is a qualified one.

15           16. A communication control method in a communication system comprising at least one mini-communicator configured to transmit predetermined identification information of its own, a server capable of being connected to a cellular communication network, and at least one mobile communication terminal functioning as an aggregation point for aggregating information from the mini-communicator, the communication control method comprising:

20

          a switching signal receiving step of receiving a switching signal for switching among a plurality of modes comprising an identification information receive mode of  
25           activating only identification information receiving means

out of the identification information receiving means for  
receiving the identification information from the  
mini-communicator, and cellular communication means for  
implementing communication with the server or another  
5 terminal via the cellular communication network, and a  
cellular communication mode of activating only the cellular  
communication means, at the mobile communication terminal;  
and

10 a switching control step of performing a mode switching  
control based on the received switching signal.

17. The communication control method according to  
Claim 16, further comprising:

15 a measuring step of measuring a reception intensity  
of a radio wave received from the mini-communicator, at the  
mobile communication terminal;

an information generating step of generating  
transmission information to the server, which contains the  
identification information of the mini-communicator  
received from the mini-communicator, identification  
20 information of the mobile communication terminal, and the  
reception intensity of the radio wave from the  
mini-communicator, at the mobile communication terminal;

25 an information transmitting step of transmitting the  
generated transmission information to the server, at the  
mobile communication terminal; and

a location estimating step of estimating a location

of a mini-communicator corresponding to the transmission information, based on the received transmission information, pre-stored location information of the mini-communicator, and pre-stored location information of the mobile communication terminal, at the server.

18. The communication control method according to Claim 17, wherein the information generating step is configured to:

compare an identification number of a mini-communicator which the mobile communication terminal was able to receive at a past point of time, with identification information of a mini-communicator which the mobile communication terminal is able to receive at the present time, to determine whether there is a difference; and generate the transmission information, in a predetermined case where it is determined at least once that there is a difference.

19. The communication control method according to Claim 16, further comprising:

a measuring step of measuring a reception intensity of a radio wave received from the mini-communicator, at the mobile communication terminal;

a receiving step of receiving from another mobile communication terminal, other terminal information containing identification information of a mini-communicator, a reception intensity of a radio wave

from said mini-communicator, and location information of the other mobile communication terminal, at the mobile communication terminal; and

5 a location estimating step of estimating a location of the mini-communicator corresponding to transmission information, based on the reception intensity of the radio wave from the mini-communicator, which was measured at the mobile communication terminal, and on the other terminal information, at the mobile communication terminal.

10 20. A communication control program to be executed by a computer in a mobile communication terminal comprising identification information receiving means for receiving identification information from at least one mini-communicator configured to transmit predetermined  
15 identification information of its own, and cellular communication means for implementing communication with a server or another terminal via a cellular communication network, the communication control program comprising:

20 a switching signal receiving step of receiving a switching signal for switching among a plurality of modes comprising an identification information receive mode of activating only the identification information receiving means out of the identification information receiving means and the cellular communication means, and a cellular  
25 communication mode of activating only the cellular communication means; and

a switching control step of performing a mode switching control based on the received switching signal.